vicinity of Cuenca, Sept. 17–24, 1908, *Rose*, no. 22893. BOLIVIA: vicinity of La Paz, alt. 10,000 ft., 1890, *Bang*, no.144; vicinity of Cochabamba, 1891, *Bang*, no. 996.

E. truncata is apparently a very local plant of the Federal District of Mexico. It is very close to *E. Dombeyana*, from which it is distinguished by its longer and proportionately narrower spikelets and by the slightly different shape of the achenes. Here belong the following: MEXICO, FEDERAL DISTRICT: wet soil, Cuantitlan, Aug. 14, 1899, *Pringle*, no. 8214; Valley of Mexico, May 7, 1898, *Pringle*, no. 7655; bords des fossés, près Mexico, May 3, 1866, *Bourgeau*, no. 214.

The appended key may help to distinguish the plants discussed.

a. Achenes 1–1.5 mm. long; upper sheaths commonly mucronate.
  b. Tubercle mucroniform, its sides nearly parallel, much less than half as wide as the body of the nearly smooth achene.
    c. Spikelets ovate, the largest not over 8 mm. long.....*E. Dombeyana.*
    c. Spikelets lanceolate to linear, rarely under 8 and up to 12 mm. long.....*E. truncata.*
  b. Tubercle pyramidal, much wider at base than above, about half as wide as the body of the achene, which is distinctly though lightly reticulate-roughened under magnification.
    d. Well-developed spikelets 70–85-flowered; scales oblong-ovate, at least the upper acute.....*E. montana.*
    d. Well-developed spikelets not over 45-flowered; scales all very obtuse.....*E, arenicola.*
a. Achenes 1.7–2 mm. long, lightly but distinctly reticulate-roughened under magnification; tubercle pyramidal; upper sheaths entire.....*E. fallax.*

GRAY HERBARIUM

NOTES ON SPARGANIUM.

M. L. FERNALD.

SINCE the publication[1] in 1907 of the detailed notes on *Sparganium* much material has accumulated and new light has been thrown on the identities and ranges of our species.

Prior to the war the most scholarly authority on the genus, Professor Wladislaw Rothert, formerly of the University of Odessa, later residing at Riga or at Cracow, had in preparation a monograph of the genus and some of the matter here presented was to have been published by him. Since, however, Dr. Rothert suffered the tragic

[1] Fernald & Eames, RHODORA, ix. 86 (1907).

fate of so many elderly Polish and Russian scientists[1] and there is no assurance that his monograph will soon be published, it seems important that, in so far as they clarify our understanding of the species, his critical notes on American *Spargania* (contained in long and detailed letters to the present writer) should now be quoted. The following notes are, therefore, based in part upon a review just made of the specific characters of *Sparganium* in eastern America, in part upon Dr. Rothert's notes.

SPARGANIUM ANDROCLADUM (Engelm.) Morong, Bull. Torr. Bot. Cl. xv. 78 (1888), in part and as to name-bringing synonym; Bicknell, ibid. xxxv. 58 (1908). *S. simplex*, var. *androcladum* Engelm. in Gray, Man. ed. 5, 481 (1867). *S. lucidum* Fernald & Eames, RHODORA, ix. 87 (1907); Rydberg, N. A. Fl. xvii. 7 (1909).

When *S. lucidum* was published too much dependence was placed upon the abundant specimens of branching *S. americanum* Nutt. (*S. simplex*, var. *Nuttallii* Engelm.) which had been labeled by Morong as *S. androcladum*.

As Dr. Rothert points out in a letter, Engelmann distinguished his var. *androcladum* from the branching state of *S. americanum*, and a detailed study of all available material makes this clear. In branching *S. americanum* the branches usually bear 1–3 pistillate and 1–6 staminate heads; in *S. lucidum* 3–8 staminate and usually 0 (very rarely 1 or even 2) pistillate heads. In *S. americanum* the fruiting heads are 1.5–2.5 cm., in *S. lucidum* 2.5–3.5 cm. in diameter; in *S. americanum* the mature carpels have the stipe 2–3 mm. long, the body 4.5–5.5 mm. long and about 2 mm. thick, the beak 1.5–5 mm. long and the stigma 1–2 mm. long; in *S. lucidum* the stipe measures 2.5–4 mm., the body 5–7 by 2.5–3 mm., the beak 4.5–6 mm. and the stigma 2–4 mm.

Engelmann's original treatment clearly shows, as Rothert points out, that the branching state of *S. americanum* (the plant taken up largely by Morong and later by Rydberg as *S. androcladum* and by Fernald & Eames as *S. americanum*, var. *androcladum*) was considered by him merely a trivial state of his var. *Nuttallii* and that his new var. *androcladum* was *S. lucidum*, most appropriately named by Engelmann from the ordinarily wholly staminate branches of the inflorescence. Engelmann's treatment follows:

[1] See Revue Gén. Bot. xxxii. 238 (1920). Professor de Jaczewski of Petrograd informs me that Dr. Rothert died in 1917.

"Var. **Nuttallii.** Like the last or type [*S. simplex*], but heads axillary; stigma linear-oblong, shorter than the style; fruit less contracted. (S. Americanum, *Nutt.*)—From Pennsylvania and New England northward and northwestward.—Inflorescence rarely branched; heads 8″–9″ wide.

Var. **androcladum.** Stouter (1½°–3° high); inflorescence branched below; branches bearing numerous sterile (rarely also 1 or even 2 fertile) heads; stigma linear, as long as the style; fruit larger, not contracted, long-tapering upwards and downwards. (S. ramosum, in part, of American authors.)—From New England southward and especially westward.—Heads 10″–12″ wide."

In this connection Rothert's decision, based upon study of Engelmann's herbarium, is important.

"As to your *S. lucidum*, my doubts as to its specific difference from *S. americanum* and its determinability in the flowering condition too had already been resolved by the very good material seen formerly [before receiving a new series of specimens], especially from Missouri, where it seems to be comparatively common. At the same time I had come to the conclusion, that this plant should bear the name *S. androcladum* (Engelm.), Engelmann having meant by his *S. simplex*, var. *androcladum* doubtless the same as your *S. lucidum*, only Morong having afterwards confounded it with the branched specimens of *S. americanum* Nutt., which Engelmann had justly and clearly distinguished from it as *S. simplex*, var. *Nuttallii.* This view is confirmed also by Engelmann's type specimens."[1]

The distribution of *S. androcladum* (*S. lucidum*) is unusual. Abundant in eastern Missouri and adjacent Illinois, it is apparently unknown or at least unrecorded in the region between the Mississippi Valley and eastern Pennsylvania. Thence it extends to Long Island and eastward to Nantucket, Cape Cod and Middlesex County, and up the Connecticut Valley to Franklin County, Massachusetts. It seems to be isolated in the Champlain Valley, Vermont (bank of Winooski River, Burlington, August 30, 1903, *N. F. Flynn*) and in the St. Lawrence Valley below Quebec (Beauport, July 30, 1905, *J. Macoun* no. 68,925). This distribution in New England and eastern Canada at once suggests that the plant has followed inland the regions where marine clays left by the Champlain subsidence are found and that search will show it to be more abundant than we now realize.

[1] Rothert in lit. July 12, 1912.

S. CHLOROCARPUM Rydberg, var. **acaule** (Beeby), n. comb. *S. simplex*, var. *acaule* Beeby in Macoun, Cat. Can. Pl. ii. 367 (1890). *S. diversifolium*, var. *acaule* Fernald & Eames, RHODORA, ix. 88 (1907). *S. acaule* Rydberg, N. A. Fl. xvii. 8 (1909).

When the erect *Sparganium* of northeastern America with supra-axillary heads and short stigma (0.8–1.7 mm. long) was separated in 1907 from the Eurasian and western American *S. simplex* Hudson, a plant with larger fruits and longer stigma, it was identified with with *S. diversifolium* Graebn. This identification was due to the fact that in the *Pflanzenr[illegible]* Graebner cites, besides the typical European material of *S. diversifolium*, Newfoundland, New England and Minnesota specimens of the common American plant. Subsequently Rydberg has described the larger extreme of the American plant as *S. chlorocarpum*[1] and has proposed as another species the smaller extreme, var. *acaule*. That the American plants should not be placed with *S. diversifolium* now seems clear. In discussing Graebner's species in 1912, Dr. Rothert said in a letter:

"I am much interested to learn from your letter, that *S. chlorocarpum* Rydb. is a form of *S. diversifolium* (in your sense) . . . I agree with you that the smaller and the larger form of *S. diversifolium* are clearly different in typical specimens . . . . I originally supposed them to be 2 distinct species; yet they are linked together by so many and various transitions, that I am quite unable to trace a limit between them, even as varieties. . . .

"As to the nomenclature of this species, I think that the name *S. diversifolium* Graebner can by no means be kept. Graebner's name comprises chiefly *S. simplex* × *minimum* and slender forms of *S. simplex;* besides, I have seen specimens of *S. affine, S. minimum, S. glomeratum* and *S. affine* × *minimum* determined by G. himself as *S. diversifolium*, not a single one of all these fitting his description. I think a name so extremely indefinite must be absolutely cancelled and the species considered as fantastic."

In the figures accompanying Graebner's original publication of *S. diversifolium*[2] the sepals are shown to be broadly obovate and narrowed to a slender claw. In our American plant the sepals are narrowly cuneate-spatulate and without definite claw. The name *S. diversifolium* should, therefore, drop from our American floras.

[1] Rydb. N. A. Fl. xvii. 8 (1909).

[2] Graebner, Schrift. Naturf. Gesellsch. Danzig, n. f. ix. 335, t. 8, fig. 1b. (1895).

S. ANGUSTIFOLIUM Michx. Fl. Bor. Am. ii. 189 (1803). *S. affine* Schnitzl. Typhac. 27 (1845). This is a circumpolar species and the identity of the Eurasian *S. affine* with our plant is clear. The specimen in the Michaux herbarium at the Muséum d'Histoire Naturelle in Paris, from Lake Mistassini, is the same as *S. affine*. This was determined by the present writer in 1903, but it had been earlier settled, apparently, by Engelmann[1] who had in 1867 cited the two as synonynous; and in 1888 Morong stated that, "Dr. Engelmann writes in a manuscript note in my possession that he, himself has seen Michaux's specimen at Paris. To this name, therefore, belongs the right of priority [over *S. affine*]."[2]

The range in New England of *S. angustifolium* (as well as the other boreal species, *S. fluctuans* and *S. minimum*) presents one feature which needs further study. *S. angustifolium* is common in the upland and northern regions of New England, extending south to Androscoggin Co., Maine, and Carroll and Grafton Counties, New Hampshire. So far as our collections indicate it is absent from southwestern Maine and southern New Hampshire, yet it occurs south of there and at lower altitudes in lakes of Essex, Middlesex and Norfolk Counties, Massachusetts. Is it truly absent from southwestern Maine and southern New Hampshire?

S. FLUCTUANS (Morong) Robinson. In the very firm texture of its fruit, with the epicarp closely investing the seed, *S. fluctuans* is unique, all our other species with long beaks having the thin and brittle epicarp easily detached from the seed. In all our other species of *Sparganium*, too, the sepals are borne chiefly at the summit of the stipe or, in the stipeless *S. eurycarpum*, at the base of the body of the fruit, and they extend from halfway nearly to the summit of the fruit. In *S. fluctuans*, on the other hand, the sepals are borne chiefly along the middle of the stipe and rarely reach the middle of the fruit. This, one of the most distinct species of the genus, is too little collected, presumably because it occurs in comparatively deep water of the larger lakes and ponds. It is essentially a boreal species, ranging from

[1] Engelm. in Gray, Man. ed. 5, 482 (1867).

[2] Morong, Bull. Torr. Bot. Cl. xv. 79 (1888). In a recent attempt (Journ. Bot. lix. 230) to clear the synonymy Mr. Arthur Bennett has misquoted Morong's words as follows: "In 1888 Morong (Bull. Torr. Bot. Club, 79) remarks: 'Engelman[n] has seen Michaux's specimen at Paris, and it is the same as *affine*';" and then drawn the amazing conclusion that, "It seems that for our plant we must use Michaux's name *affine*."

Newfoundland to Lake Mistassini and southward into the northern states. In New England it presents the same anomaly in distribution as *S. angustifolium*, occuring southward to Kennebec, Androscoggin and Oxford Cos., Maine, and Belknap Co., New Hampshire, but being unknown from southwesternMaine and southern New Hampshire, although found in lakes and ponds of Middlesex and Norfolk Cos., Massachusetts. Is it absent from southwestern Maine and southern New Hampshire?

S. MINIMUM Fries. This circumpolar species shows a peculiarity of range in New England similar to those just discussed. Frequent in Maine (south to Androscoggin Co.) and Vermont, the species is quite unknown from New Hampshire except for an old specimen with indefinite data, apparently collected at Meredith, Belknap Co., yet it occurs in Middlesex County, Massachusetts. Is *S. minimum* absent or essentially so from southwestern Maine and from New Hampshire?

In view of the many changes in the treatment of *Sparganium* the following new key to the species occurring from New England and New York northward is offered and a statement of the ranges within this area appended. Specimens showing extension of range or divergence of the specific characters will be gratefully received.

A. Stigmas 2, filiform: mature carpels sessile, broadly wedge-shaped or obpyramidal below, rounded, broadly conical or subtruncate above, 4–8 mm. thick: sepals nearly equaling the body of the fruit. . . . . 1. *S. eurycarpum.*

A. Stigma 1, linear to ovate: mature carpels about equally narrowed to summit and to the more or less stipitate base, 1.2–3 mm. thick: sepals much shorter than to ⅔ as long as body of fruit. B.

B. Staminate heads 2–20 (rarely only 1): fruiting heads 1.2–3.5 cm. in diameter: mature carpels strongly fusiform, 5.5–14 mm. long; the stipe 1–4 mm. long; the usually slender beak 1.5–6 mm. long: inflorescence simple or branching. C.

C. Sepals borne chiefly at summit of stipe, ½–⅔ as long as body of fruit: epicarp thin and brittle, readily removed from the seed; beak fragile, slender, straight or curved; stigma linear to lanceolate, 0.6–4 mm. long: anthers 0.8–1.6 mm. long: erect terrestrial plants or, if aquatic, with the floating leaves rounded and cellular-reticulate beneath and flat and opaque above. D.

D. Heads or branches of inflorescence all axillary. E.

E. Leaves stiffish, at least the middle keeled: bracts strongly ascending: branches bearing 3–8 staminate and 0 (very rarely 1 or 2) pistillate heads: stigma 2–4 mm. long: fruiting heads 2.5–3.5 cm. in diameter: mature carpels lustrous; stipe 2.5–4 mm. long: body of fruit 5–7 mm. long, 2.5–3 mm. thick; beak 4.5–6 mm. long: receptacle fimbrillate–alveolate: anthers 1–1.6 mm. long. 2. *S. androcladum.*

E. Leaves soft and mostly translucent, flat or obscurely keeled: bracts spreading or spreading-ascending: inflorescence simple or branched, the branches (when present) usually with 1–3 pistillate and 1–6 staminate heads: stigma 1–2 mm. long: fruiting heads 1.5–2.5 cm. in diameter: mature carpels opaque or but slightly lustrous; stipe 2–3 mm. long; body 4.5–5.5 mm. long, about 2 mm. thick; beak 1.5–5 mm. long: receptacle scarcely alveolate: anthers 0.8–1.2 mm. long... 3. *S. americanum.*

D. Some of the heads or branches supra-axillary. F.

F. Commonly erect and emersed: leaves flat or slightly keeled, little if at all dilated at base (except for the scarious margin): staminate half of inflorescence 2–10 cm. long, of 4–9 scattered heads (if shorter and with fewer heads, the plant very low and with ribbon-like translucent erect lower bracts): beak of fruit 2–4.3 mm. long: sepals appressed, cuneate-spatulate, scarcely narrowed to a claw.....4. *S. chlorocarpum.*

F. Commonly submersed or floating, sometimes emersed: leaves rounded on the back; the middle and upper with dilated and subinflated sheathing bases: staminate half of inflorescence 1–3 cm. long, of 1–4 (rarely –6) crowded heads: beak about 2 mm. long: sepals loosely ascending, with slender claw and dilated tip.....5. *S. angustifolium.*

C. Sepals borne chiefly along the middle of the stipe, rarely reaching the middle of the fruit: epicarp closely investing the seed: fruit with a strong gladiate-falcate beak: stigma oblong to lance-ovate, 0.4–0.7 mm. long: anthers 0.4–0.7 mm. long: plant aquatic, with flat translucent loosely cellular-reticulate leaves and branching inflorescences.....6. *S. fluctuans.*

B. Staminate head 1: fruiting heads 5–12 mm. in diameter: mature carpels ellipsoid- or slenderly obovoid-fusiform, 3–5.5 mm. long; stipe obsolete or up to 1 mm. long; beak obsolete or up to 1.5 mm. long: inflorescence simple. G.

G. Pistillate heads all axillary: fruit tapering to a conical beak 0.5–1.5 mm. long: sepals elliptic to cuneate-spatulate, ½–⅔ as long as the body of the fruit.....7. *S. minimum.*

G. One or more of the heads supra-axillary: fruit beakless: sepals wanting or slenderly spatulate and rarely ½ as long as the body of the fruit.....8. *S. hyperboreum.*

1. S. EURYCARPUM Engelm.—Shallow water at margins of ponds, pools and streams, chiefly at low altitudes, widely dispersed over the United States and southern Canada, northward with us to the Great Lakes and St. Lawrence (east to Rimouski Co., QUEBEC), Champlain Valley, VERMONT, Franklin, southern Penobscot and Washington Cos., MAINE, southern and southeastern NEW BRUNSWICK, central and eastern NOVA SCOTIA, PRINCE EDWARD ISLAND and the MAGDALEN ISLANDS.

2. S. ANDROCLADUM (Engelm.) Morong. *S. lucidum* Fernald & Eames.—Muddy or peaty shores, swamps or shallow water, eastern

Pennsylvania to Long Island, NEW YORK, eastward to Nantucket, Cape Cod and Middlesex Co. and up the Connecticut Valley to Franklin Co., MASSACHUSETTS; Chittenden Co., VERMONT; Quebec Co., QUEBEC; also Illinois and Missouri.

3. S. AMERICANUM Nutt. Including var. *androcladum* Fernald & Eames, not *S. simplex*, var. *androcladum* Engelm. *S. androcladum* Morong, as to plant in great part.—Muddy or peaty shores, swamps or shallow water, common southward, extending north to Muskoka District, ONTARIO, northern VERMONT and NEW HAMPSHIRE, Franklin, Penobscot and southern Aroostook Counties, MAINE, Kent Co., NEW BRUNSWICK, PRINCE EDWARD ISLAND, Cape Breton Island, NOVA SCOTIA, and Avalon Peninsula, NEWFOUNDLAND.

4. S. CHLOROCARPUM Rydberg. A species with two freely intergrading varieties.

Pistillate heads (1–) 2–4, remote or subremote, in maturity 1.5–2.7 cm. in diameter; the lowest borne 1–6.5 dm. above the base of the plant: staminate half of inflorescence 2–10 cm. long, of 4–9 heads..... *S. chlorocarpum* (typical).

Pistillate heads 1–3, at least the upper usually approximate, in maturity 1.2–2.2 cm. in diameter; the lowest borne 0.1–1.8 dm. above the base of the plant: staminate half of inflorescence 1–4(–5) cm. long, of 2–5 heads..... Var. *acaule*

S. CHLOROCARPUM (typical). *S. diversifolium* Fernald & Eames, not Graebn.—Muddy and peaty shores or swamps or in shallow water, NEWFOUNDLAND, MAGDALEN ISLANDS and Gaspé Co., QUEBEC to Algonquin Park, ONTARIO, south to NOVA SCOTIA, southern MAINE, Bristol Co., MASSACHUSETTS, CONNECTICUT, northern New Jersey, central and western NEW YORK, Indiana and Iowa.

Var. ACAULE (Beeby) Fernald. *S. diversifolium*, var. *acaule* (Beeby) Fernald & Eames. *S. acaule* (Beeby) Rydb.— Similar habitats and range, commoner northward, but extending to Nassau Co., Long Island, NEW YORK, in the uplands to Virginia and West Virginia, and North Dakota.

5. S. ANGUSTIFOLIUM Michx. *S. affine* Schnitzl. *S. simplex* Fernald & Eames, as to plant of eastern America, not Hudson.— Deep or shallow water or muddy or peaty shores, NEWFOUNDLAND and Straits of Belle Isle to Lake Mistassini, QUEBEC, west to Alaska, south to NOVA SCOTIA, eastern and central counties and Androscoggin Co., MAINE, Carroll and Grafton Cos., NEW HAMPSHIRE, Essex, Middlesex and Norfolk Cos., MASSACHUSETTS, Litchfield Co., CONNECTICUT, Catskill Mts. and Oneida Lake, NEW YORK, uplands of northern New Jersey and Pennsylvania, Michigan, Colorado and California, ascending in our mountains to 1104 m. (3600 feet); also Eurasia.

6. S. FLUCTUANS (Morong) Robinson.—Cold waters of lakes and ponds, chiefly in silicious regions, NEWFOUNDLAND to Lake Mistassini, QUEBEC and northern Minnesota, south to NOVA SCOTIA,

Kennebec, Androscoggin and Oxford Cos., MAINE, Belknap Co., NEW HAMPSHIRE, Norfolk and southwestern Middlesex Cos., MASSACHUSETTS, Litchfield Co., CONNECTICUT, Oneida Co., NEW YORK and the uplands of Pennsylvania.

7. S. MINIMUM Fries.—Shallow water of springy spots, brooks, pools and ponds, NEWFOUNDLAND and Anticosti Island, QUEBEC to Lake Ontario basin, ONTARIO, Manitoba and Alaska, south to Cape Breton Island and northern and northwestern NOVA SCOTIA, southeastern and central MAINE (south to Androscoggin Co.), Belknap Co., NEW HAMPSHIRE, southern and southwestern Middlesex Co., MASSACHUSETTS, Litchfield Co., CONNECTICUT, central and western NEW YORK, uplands of northern New Jersey and Pennsylvania, Michigan, Wisconsin, Utah and Oregon; Eurasia.

8. S. HYPERBOREUM Laestad.—An arctic species, extending south, especially in peaty pools, to NEWFOUNDLAND, Cape Breton Island, NOVA SCOTIA, southern Saguenay Co., Anticosti Island and Big River, QUEBEC, northern Manitoba and southern Alaska; Eurasia.

GRAY HERBARIUM.

THE IDENTITY OF THE GENUS ADVENTINA RAF.

S. F. BLAKE.

IN 1836 Rafinesque[1] described under the name *Adventina* a new genus of *Asteraceae* which he had found growing as a weed in the Bartram Garden at Philadelphia. In spite of the full description given, no later author has identified his plant, or plants, for two species were described. Bentham, in the Genera Plantarum, omitted this, as he did practically all the other names proposed by Rafinesque; Baillon likewise does not refer to it, nor does O. Hoffmann in the Pflanzenfamilien; and in Dalla Torre and Harms's Index it is given only among the "Genera incertae sedis." From Rafinesque's description,[2] which

[1] New Fl. N. Amer. **1**: 67–68. 1836.

[2] "ADVENTINA Raf. Radiate. Perianthe globular 5 phyle, Sepals connivent equal ovate acute. Phoranthe flat chaffy. Rays 5 fertile, equal small and opposed to sepals, ligules short trilobe white, ovary and seed shut between the sepals and internal palea or chaff, similar to sepals oblong and thus bivalved; style very short bifid, pappus paleaceous multifid. Floscules of the disk minute yellow complete, chaff lanceolate flat, corolla tubular 5toothed, stamens and style inclosed, pappus campanulate multifid.—Seeds black oblong compressed bivalved in rays, oblong terete in disk. *Leaves opposite, flowers terminal.*

"1. PARVIFLORA Raf. Stem slender branched diffuse smooth, leaves petiolate ovate acute angular dentate, lower rounder, upper nearly sessile and entire; flowers terminal lax—Growing spontaneous for several years in the orchard of Bartram's Garden, come with seeds from the South. Annual, Estival, pedal. Leaves thin smooth,